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POINTING DEVICE FOR DISPLAY DEVICE
[Deisupurei sochi no pointeingu debaisu]

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Specification

1. Title of the Invention

Pointing device for display device

2. Claim

A pointing device for a display device, comprising

a fingerprint detection means that detects a fingerprint pattern at every preset time interval,

a fingerprint memory means that records fingerprint patterns detected by this fingerprint detection means,

a fingerprint comparison means that compares and judges the match of a fingerprint pattern recorded in this fingerprint memory means and a fingerprint pattern newly detected by the above fingerprint detection means,

a finger movement detection means that detects the direction of movement and the distance of movement of a finger based on the results of fingerprint detection at every fixed interval by the above fingerprint detection means when judgment of match was made by this fingerprint comparison means,

and a movement control means that moves the display position on the display screen according to the direction of movement and the distance of movement of a finger detected by this finger movement detection means.

3. Detailed Explanation of the Invention

[Purpose of the Invention]

(Industrial Field of Application)

The present invention relates to a pointing device for a display device such as a CRT or LCD.

(Prior Art)

Data processing devices, such as personal computers, word processors, and graphics processing devices, as well as all kinds of control systems are equipped with display devices (CRT, LCD, plasma [display], EL [electroluminescence display], and the like) for displaying their processing data and control information, and as a pointing device for performing specification such as of input position by moving a cursor and the like on the screens of these display devices, the mouse can be mentioned as the most common device.

Figures 2(A) and (B) are a side view and plan view showing the constitution of mouse 11.

The main body of mouse 11 is of a size sufficient to be held by a human hand, and the bottom surface of this mouse 11 is equipped with a ball 12 that rotates freely according to movement of that mouse 11 on a horizontal surface. This ball 12 is provided with and contacted by a roller 13x to which rotation of that ball 12 in the x direction is propagated and a roller 13y to which rotation of that ball 12 in the y direction is propagated, and pulse signals are output from these rollers 13x and 13y as detection signals of fixed amounts of rotation.

In short, when mouse 11 is moved in a desired direction on a horizontal surface 14 where the display device is set, the amount of

movement in the x direction and the amount of movement in the y direction pursuant to movement of this mouse 11 are respectively detected by the above rollers 13x and 13y. By this means, the cursor position on the screen in the display device comes to be moved in the x and y directions according to the amount of movement of the above mouse 11.

(Problems that the Invention is to Solve)

However, because the principle of the above mouse 11 is to detect the amount of movement in the x and y directions by rolling ball 12, sufficient space is required in order to rotate that ball 12, and the movement operation surface of mouse 11 must be a horizontal surface so that the mouse 11 does not end up being moved freely by ball 12.

Also, during input processing by keyboard operations, there may be persons who are not permitted actual input processing if an ID code is not matched in advance, but in the case of the above mouse 11, there is a problem that there is not provided any security measure at all according to use by other persons.

The present invention was created in consideration of the above problems, and its purpose is to provide a pointing device for a display device, in which cursor movement operations can be performed easily in all input circumstances when moving the cursor on the screen, without the movement operation surface being constrained, for example, to a sufficient width or to a horizontal surface, and input processing is enabled only for specified persons.

(Means of Solving the Problems)

That is, the pointing device for a display device pertaining to the

present invention is constituted comprising a fingerprint detection means that detects a fingerprint pattern at every preset time interval, a fingerprint memory means that records fingerprint patterns detected by this fingerprint detection means, a fingerprint comparison means that compares and judges the match of a fingerprint pattern recorded in this fingerprint memory means and a fingerprint pattern newly detected by the above fingerprint detection means, a finger movement detection means that detects the direction of movement and the distance of movement of a finger based on the results of fingerprint detection at every fixed interval by the above fingerprint detection means when judgment of match was made by this fingerprint comparison means, and a movement control means that moves the display position on the display screen according to the direction of movement and the distance of movement of a finger detected by this finger movement detection means.

(Operation)

In short, by using a fingerprint recognition device as the above fingerprint detection means, minute movements of the finger can be detected whereby cursor movement on the screen of the display device according to the direction of movement and the distance of movement thereof is accomplished, and a security measure by matching of fingerprints is provided.

(Working Examples)

Below, a working example of the present invention is explained according to the drawing.

Figure 1 shows the constitution of a pointing device for a display device, and this pointing device comprises an optical scanner 21. This

21 → 22 → CONTROL → (23); 24; 25; 26

optical scanner 21 iteratively detects a fingerprint pattern of a finger placed on a transparent pointing pad 21a covering the operating surface of that scanner 21 by optically scanning at each preset time interval (for example, 0.1 seconds), and the fingerprint pattern detected at each fixed time interval by this optical scanner 21 is transferred to a control circuit 22.

This control circuit 22 controls a memory component 23, comparison component 24, operation component 25, and display device 26 according to fingerprint detection signals from the above optical scanner 21.

Memory component 23 is constituted by RAM and the like, and records and registers arbitrary fingerprint patterns detected by the above optical scanner 21, for example, as black-and-white binary image data, and a specified fingerprint pattern recorded by this memory component 23 is utilized as operator matching data in order to perform input permission with respect to the display device.

Comparison component 24 compares and judges the match of a specified fingerprint pattern registered as operator matching data in the above memory component 23 and a fingerprint pattern newly detected by the above optical scanner 21, and a comparison judgment signal from this comparison component 24 is output to control circuit 22.

Here, the comparison and judgment processing of a fingerprint pattern in the above comparison component 24 is executed only when a fingerprint pattern was newly detected after a specified time (for example, 1 minute) has elapsed since a fingerprint pattern has no longer been detected by the above optical scanner 21, and when a judgment of non-matching of a fingerprint pattern was made by this comparison

component 24, all output of control signals to display device 26 from control circuit 22 is forbidden.

Operation component 25 receives a fingerprint pattern detected by the above optical scanner 21 as x, y coordinate data on that scanner 21 through control circuit 22, and computes the shift of coordinates based on the change of position (movement) of the finger as direction and distance for each detection operation of the fingerprint pattern, and a cursor movement control signal with respect to display device 26 is output from control circuit 22 according to the direction of the shift of position (movement) and the distance of the shift of position (movement) of the finger computed in this operation component 25. 27

Next, the operation of the pointing device for a display device according to the above constitution is explained.

First, the user allows his or her own fingerprint to be detected by optical scanner 21 whereby that fingerprint pattern is recorded and registered in memory component 23 by way of control circuit 22.

Also, when a new fingerprint pattern is detected by optical scanner 21 after a specified time or longer has elapsed, this newly detected fingerprint pattern is sent to comparison component 24, and it is judged as to whether or not it matches the specified fingerprint pattern recorded in advance in the above memory component 23.

Here, when a match judgment signal is output from comparison component 24 to control circuit 22, control circuit 22 henceforth provides operation component 25 with x, y coordinate data of the fingerprint pattern on optical scanner 21 being iteratively transferred from that scanner 21 at each fixed time interval, and the direction of

movement and the distance of movement of the finger corresponding to the shift of position of that coordinate data are computed. Then, control circuit 22 outputs cursor movement control signals to display device 26 according to the direction of movement and the distance of movement of the finger computed at each fixed time interval by the above operation component 25, and by this means, the cursor on the display screen of display device 26 comes to be displayed moving according to the movement of the finger on the above optical scanner 21. 3/

On the other hand, when a non-match signal was output to control circuit 22 during comparison and judgment of a fingerprint pattern in the above comparison component 24, the operator who is presently trying to perform cursor movement operation by optical scanner 21 becomes an improper user, and all output of control signals to display device 26 from control circuit 22 is forbidden. 23/

Therefore, according to the pointing device for a display device of the above constitution, because optical scanner 21 which detects fingerprint patterns is used as a cursor movement operation means with respect to display device 21, and the direction of movement and the distance of movement of a finger are sought according to the pattern detection data from this optical scanner 21, such that data for cursor movement control is obtained, detection of fingerprint patterns is possible at any position and at any angle at which the above optical scanner 21 is set, moreover, because sufficient movement space for moving the aforementioned mouse 11 shown in Figure 2 is not required, high-precision cursor movement control according to movement of the user's fingertip can be easily accomplished. 1 19

Furthermore, by registering the user's fingerprint pattern in advance and performing comparison and judgment of matching with the operator's fingerprint pattern, a security measure for input access to display device 26 can be provided.

[Effects of the Invention]

According to the present invention as above, because it is constituted comprising a fingerprint detection means that detects a fingerprint pattern at every preset time interval, a fingerprint memory means that records fingerprint patterns detected by this fingerprint detection means, a fingerprint comparison means that compares and judges the match of a fingerprint pattern recorded in this fingerprint memory means and a fingerprint pattern newly detected by the above fingerprint detection means, a finger movement detection means that detects the direction of movement and the distance of movement of a finger based on the results of fingerprint detection at every fixed interval by the above fingerprint detection means when judgment of match was made by this fingerprint comparison means, and a movement control means that moves the display position on the display screen according to the direction of movement and the distance of movement of a finger detected by this finger movement detection means, a pointing device for a display device can be provided, in which cursor movement operations can be performed easily in all input circumstances when moving the cursor on the screen, without the movement operation surface being constrained, for example, to a sufficient width or to a horizontal surface, and input processing is enabled only for specified persons.